CHARLES DARWIN UNIVERSITY

Family Name	
Given Names	
Student Number	
Teaching Period	Semester 1, 2017

FINAL EXAMINATION	**DURATION**
HIT174 – Network Engineering Concepts	Reading Time: **10** minutes Writing Time: **180** minutes

INSTRUCTIONS TO CANDIDATES

The examination has **3** sections

Section A: Suggested Time:	**Multiple Choice Questions**: Answer ALL 20 questions 40 minutes (20 marks)
Section B: Suggested Time:	**Short Answer Questions**: Answer ALL 13 questions 95 minutes (50 marks)
Section C: Suggested Time:	**Case Study:** Answer ALL questions 45 minutes (30 marks)

Note that questions **ARE NOT** of equal value.

Read **ALL** questions carefully.

EXAM CONDITIONS

You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.

This is a CLOSED BOOK examination

No calculators are permitted

No handwritten notes are permitted

No dictionaries are permitted

ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED
No additional printed material is permitted	1 x 20 Page Book 1 x Scrap Paper

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Section B

Short Answer Questions

Total No of Marks for this section: 50

This section should be answered in the Answer Booklet provided.

Marks for each question are indicated.

Suggested Time allocation for Section B: 95 mins

Question 1

(a) The top-down order of the OSI model is: application, session, presentation, transport, network, data link and physical.

(b) When two conflicting permissions for a remote user exist between share permissions and NTFS permissions, the user will receive the most permissive access

(c) When securing a network, it is best to encrypt and secure all forms of traffic, regardless of content or source and destination

(d) The Data link layer connects the network software to the network hardware

(2 marks)

Question 2

Convert the following: You are required to show all appropriate workings.

(a) Decimal to binary notation: 225.108.71.24

(b) Hexadecimal to Binary notation: FA:6D:5B:13:E0:38

(4 marks)

Question 3

Use either the Binary AND or Binary OR method to answer the following questions. You are required to show all appropriate workings.

(a) What is the network address of 192.168.100.130 with subnet mask of 255.255.255.224?

(b) What is the broadcast address of 100.100.137.58 with a prefix of /14?

(4 marks)

Question 4

Fill in the table below:

Acronym	**Full Name**	**OSI layer**
ARP		
FTP		
ICMP		
OSPF		
SMTP		
DNS		
TCP		

(14 marks)

Question 5

Given the network address of 192.168.10.0/24, you need to create 4 subnets. Answer the following questions and fill in the table:

(a) Number of bits borrowed: _____

(b) Total number of usable hosts/subnet: _____

(c) Complete the table below:

Subnet	Network address	Prefix	1st usable host address	Last usable host address	Broadcast address
1st					
2nd					
3rd					
4th					

(10 marks)

Question 6

Describe the differences between TFTP and FTP

(2 marks)

Question 7

Define RIP and explain how it is used

(3 marks)

Question 8

How does CSMA/CA work in a wireless network?

(3 marks)

Question 9

What are the advantages of using Network Address Translation (NAT)?

(3 marks)

Question 10

Describe a man-in-the-middle attack

(2 marks)

Question 11

In what network circumstances would it be more advantageous to use static routing instead of dynamic routing protocols?

(3 marks)

Section C

Case Study

Total Number of Marks for this section: 30

This section should be answered in the Answer Booklet provided.

Marks for each question are indicated. Suggested Time allocation for Section C: 45 mins

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XYZ is a large organisation that has employed you to setup the network for their company. They have the IP address of 138.80.128.0 / 22 and their staffs are divided into 4 groups as shown below.

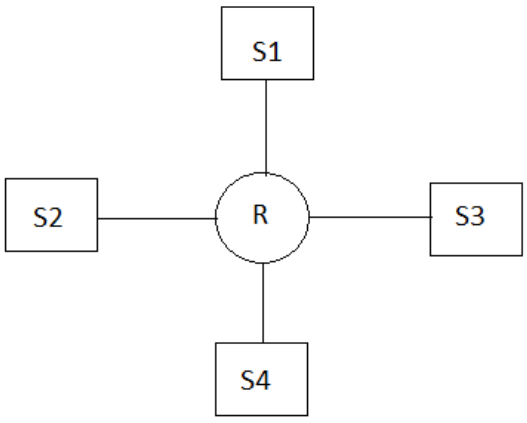
- Technical: 100 staff
- Administrative: 50 staff
- Research: 20 staff
- Management: 3 staff

You are asked to create a LAN for each group and to set up the following:

- The server is kept within the technical LAN and is allocated the first usable host address of that LAN
- There is a printer for each group and is allocated the second usable host address for each LAN
- The gateway address is assigned the last usable IP address for each LAN
- Other devices connected to the network are allocated IP address via DHCP

You came up with a topology as shown below:

Topology



R: Router

S1: Switch 1 for the Administrative LAN

S2: Switch 2 for the Research LAN

S3: Switch 3 for the Management LAN

S4: Switch 4 for the Technical LAN

Based on the above scenario, answer the following questions:

1. What is the total number of networks for the topology?

   (1 mark)

2. Without using VLSM to allocate IP addresses meet the requirements of XYZ,
   i. What is the largest number of subnets you can have? (2 mark)
   ii. What is the smallest number of subnets that you need (1 mark)
   iii. How many subnets would you prefer to have? Why? (3 marks)

3. Using VLSM, allocate IP address in an efficient manner to answer the following:
   i. What is the IP address and subnet mask (in dotted decimal notation) of the server?

      (2 mark)

   ii. What is the IP address and subnet mask (in dotted decimal notation) of the printer for the management LAN?

      (2 mark)

   iii. What is the range of usable host address for the research LAN?

      (2 mark)

   iv. What is the gateway IP address and subnet mask (in dotted decimal notation) for the administrative LAN?

      (2 mark)

   v. How many unallocated host IP address are you left with?

      (2 marks)

4. You are asked to provide redundancies in your design. State how you would go about doing it and draw your new design.

   (7 marks)

5. After setting up your proposed topology for a few days, a new administrative employee brought her laptop (with IP address: 138.80.128.191) tried to connect to the network but she failed. What could be the problem and what could be the solution?

   (2 marks)

6. What network monitoring protocol would you use to monitor the network for the company and what would you be monitoring?

   (4 marks)